

Biomass Gasifier Power Projects- Other States					Annexure-4I
S. No.	Assumption Head	Sub-Head	Sub-Head (2)	Unit	Parameters
1	Power Generation	Capacity	Installed Power Generation Capacity	MW	1
			Auxiliary Consumption during stabilisation	%	10%
			Auxiliary Consumption after stabilisation	%	10%
			PLF(Stablization for 6 months)	For First 6 Months	85%
			PLF(during first year after Stablization)	Next six months	85%
			PLF(second year onwards)	2 nd Year Onwards	85%
			Useful Life	Years	25
2	Project Cost	Capital Cost/MW	Power Plant Cost	Rs Lakh/MW	443.00
3	Sources of Fund	Debt: Equity	Debt	%	70%
			Equity	%	30%
			Total Debt Amount	Rs Lakh	310.10
			Total Equity Amout	Rs Lakh	132.90
		Debt Component	Loan Amount	Rs Lakh	310.10
			Moratorium Period	years	0
			Repayment Period(incld Moratorium)	years	15.00
			Interest Rate	%	9.00%
		Equity Component	Equity amount	Rs Lacs	132.90
			Return on Equity (upto 20 years)	% p.a	16.96%
			Return on Equity (after 20 years)	% p.a	21.52%
			Discount Rate (Equiv. to WACC)		8.30%
	Financial Assumptions	Fiscal Assumptions	Income Tax	%	34.94%
			MAT Rate	%	17.47%
		Depreciation	Depreciation Rate(Power Plant)	%	4.67%
			Depreciation Rate 16th year onwards	%	2.00%
5	Working Capital	For Fixed Charges	O&M Charges	Months	1
			Maintenance Spare	(% of O&M exepenses)	15.00%
			Receivables for Debtors	Months	1.5
		For Variable Charges	Biomass Stock	Months	4
			Interest On Working Capital	%	10.50%
6	Fuel Related Assumptions	Biomass	Specific Fuel Consumption	kg/kWh	1.25
			Base Price	Rs/T	3734.85
			Biomass Price Escalation Factor	%	5.00%
7	Operation & Maintenance		O&M Cost of power plant	Rs Lakh	63.66
			Total O & M Expenses Escalation	%	3.84%
8	Generation & Sale of Energy		Total No .Of Hours		8766.00

CERC RE Tariff Order FY 2020-21

Biomass Gasifier : Determination of Tariff Component

Units Generation	Unit	Year-->	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Installed Capacity	MW		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Net Generation	MU		6.71	6.71	6.71	6.71	6.71	6.71	6.71	6.71	6.71	6.71	6.71	6.71	6.71	6.71	6.71	6.71	6.71	6.71	6.71	6.71	6.71	6.71	6.71	6.71	6.71
Variable Cost	Unit	Year-->	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Biomass Cost	Rs. Lakh		347.86	365.25	383.51	402.69	422.83	443.97	466.16	489.47	513.95	539.64	566.63	594.96	624.71	655.94	688.74	723.17	759.33	797.30	837.16	879.02	922.97	969.12	1017.58	1068.46	1121.88
Per unit Variable Cost	Rs/kWh		5.19	5.45	5.72	6.00	6.31	6.62	6.95	7.30	7.66	8.05	8.45	8.87	9.32	9.78	10.27	10.78	11.32	11.89	12.48	13.11	13.76	14.45	15.17	15.93	16.73
Fixed Cost	Unit	Year-->	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
O&M Expenses	Rs Lakh		63.66	66.11	68.65	71.28	74.02	76.86	79.81	82.88	86.06	89.37	92.80	96.36	100.06	103.91	107.90	112.04	116.34	120.81	125.45	130.26	135.27	140.46	145.85	151.46	157.27
Depreciation	Rs Lakh		20.69	20.69	20.69	20.69	20.69	20.69	20.69	20.69	20.69	20.69	20.69	20.69	20.69	20.69	20.69	8.86	8.86	8.86	8.86	8.86	8.86	8.86	8.86	8.86	8.86
Interest on term loan	Rs Lakh		26.98	25.12	23.25	21.39	19.53	17.67	15.81	13.94	12.08	10.22	8.36	6.50	4.63	2.77	0.91	-	-	-	-	-	-	-	-	-	-
Interest on working Capital	Rs Lakh		20.32	21.24	22.20	23.21	24.28	25.39	26.56	27.79	29.08	30.43	31.86	33.35	34.92	36.56	38.29	39.95	41.88	43.90	46.02	48.25	50.66	53.11	55.68	58.38	61.20
Return on Equity	Rs Lakh		22.55	22.55	22.55	22.55	22.55	22.55	22.55	22.55	22.55	22.55	22.55	22.55	22.55	22.55	22.55	22.55	22.55	22.55	22.55	22.55	28.60	28.60	28.60	28.60	28.60
Total Fixed Cost	Rs Lakh		154.20	155.70	157.34	159.12	161.06	163.16	165.42	167.85	170.46	173.25	176.25	179.44	182.85	186.47	190.33	183.40	189.63	196.12	202.88	209.92	223.39	231.03	239.00	247.29	255.93
Per unit Fixed Cost	Rs/kWh	2.61	2.30	2.32	2.35	2.37	2.40	2.43	2.47	2.50	2.54	2.58	2.63	2.68	2.73	2.78	2.84	2.73	2.83	2.92	3.03	3.13	3.33	3.45	3.56	3.69	3.82

Levillised tariff corresponding to Useful life

Per Unit Cost of Generation	Unit	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
Per unit Variable Cost	Rs/kWh	8.14	5.19	5.45	5.72	6.00	6.31	6.62	6.95	7.30	7.66	8.05	8.45	8.87	9.32	9.78	10.27	10.78	11.32	11.89	12.48	13.11	13.76	14.45	15.17	15.93	16.73
O&M expn	Rs/kWh	1.33	0.95	0.99	1.02	1.06	1.10	1.15	1.19	1.24	1.28	1.33	1.38	1.44	1.49	1.55	1.61	1.67	1.73	1.80	1.87	1.94	2.02	2.09	2.17	2.26	2.35
Depreciation	Rs/kWh	0.27	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
Int. on term loan	Rs/kWh	0.20	0.40	0.37	0.35	0.32	0.29	0.26	0.24	0.21	0.18	0.15	0.12	0.10	0.07	0.04	0.01	-	-	-	-	-	-	-	-	-	-
Int. on working capital	Rs/kWh	0.46	0.30	0.32	0.33	0.35	0.36	0.38	0.40	0.41	0.43	0.45	0.48	0.50	0.52	0.55	0.57	0.60	0.62	0.65	0.69	0.72	0.76	0.79	0.83	0.87	0.91
RoE	Rs/kWh	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.43	0.43	0.43	0.43	0.43	0.43
Total COG	Rs/kWh	10.74	7.49	7.77	8.07	8.38	8.71	9.05	9.42	9.80	10.21	10.63	11.08	11.55	12.04	12.56	13.11	13.52	14.15	14.81	15.51	16.24	17.09	17.90	18.74	19.62	20.55
Discount Factor	Levellised		1	0.92	0.85	0.79	0.73	0.67	0.62	0.57	0.53	0.49	0.45	0.42	0.38	0.35	0.33	0.30	0.28	0.26	0.24	0.22	0.20	0.19	0.17	0.16	0.15
Variable Cost	5.19																										
Levllised Tariff (Fixed)	2.61																										
Levllised Tariff	7.79	Rs/Unit																									

Determination of Additional Depreciation for Biomass Gasifier Power Projects

Depreciation amount	90%																									
Book Depreciation rate	5.28%																									
Tax Depreciation rate	40%																									
Additional Depreciation	20%																									
Income Tax (MAT)	17.472%																									
Income Tax (Normal Rates)	34.944%																									
Capital Cost	443.00																									
Years	Unit	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Book Depreciation	%	2.64%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	2.88%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Book Depreciation	Rs Lakh	11.70	23.39	23.39	23.39	23.39	23.39	23.39	23.39	23.39	23.39	23.39	23.39	23.39	23.39	23.39	23.39	23.39	12.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Accelerated Depreciation																										
Opening	%	100%	70%	35%	21%	13%	8%	5%	3%	2%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Allowed during the year	%	30.00%	35.00%	14.00%	8.40%	5.04%	3.02%	1.81%	1.09%	0.65%	0.39%	0.24%	0.14%	0.08%	0.05%	0.03%	0.02%	0.01%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Closing	%	70.0%	35.0%	21.0%	12.6%	7.6%	4.5%	2.7%	1.6%	1.0%	0.6%	0.4%	0.2%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Accelerated Depm.	Rs Lakh	132.90	155.05	62.02	37.21	22.33	13.40	8.04	4.82	2.89	1.74	1.04	0.63	0.38	0.23	0.14	0.08	0.05	0.03	0.02	0.01	0.01	0.00	0.00	0.00	0.00
Net Depreciation Benefit	Rs Lakh	121.20	131.66	38.63	13.82	-1.06	-9.99	-15.35	-18.57	-20.50	-21.65	-22.35	-22.77	-23.02	-23.17	-23.26	-23.31	-23.34	-12.73	0.02	0.01	0.01	0.00	0.00	0.00	0.00
Tax Benefit	Rs Lakh	42.35	46.01	13.50	4.83	-0.37	-3.49	-5.36	-6.49	-7.16	-7.57	-7.81	-7.96	-8.04	-8.09	-8.13	-8.15	-8.16	-4.45	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Energy generation	MU	3.35	6.71	6.71	6.71	6.71	6.71	6.71	6.71	6.71	6.71	6.71	6.71	6.71	6.71	6.71	6.71	6.71	6.71	6.71	6.71	6.71	6.71	6.71	6.71	6.71
Per unit benefit	Rs/Unit	1.26	0.69	0.20	0.07	-0.01	-0.05	-0.08	-0.10	-0.11	-0.11	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.12	-0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Discounting Factor		1.00	0.92	0.85	0.79	0.73	0.67	0.62	0.57	0.53	0.49	0.45	0.42	0.38	0.35	0.33	0.30	0.28	0.26	0.24	0.22	0.20	0.19	0.17	0.16	0.15
Applicable Discounting Factor		1.00	0.96	0.89	0.82	0.76	0.70	0.65	0.60	0.55	0.51	0.47	0.43	0.40	0.37	0.34	0.31	0.29	0.27	0.25	0.23	0.21	0.20	0.18	0.17	0.15
Tax Benefit Levellised	5.34	Rs/Unit																								
Electricity Generation (Levellised)	6.42	Rs/Unit																								
Levellised benefit	0.08	Rs/Unit																								

Biogas Power Projects					Annexure-5A
S. No.	Assumption Head	Sub-Head	Sub-Head (2)	Unit	Parameters
1	Power Generation	Capacity	Installed Power Generation Capacity	MW	1
			Auxiliary Consumption	%	12%
			PLF	%	90%
			Useful Life	Years	25
2	Project Cost	Capital Cost/MW	Power Plant Cost	Rs Lakh/MW	886.00
3	Sources of Fund	Debt: Equity	Debt	%	70%
			Equity	%	30%
			Total Debt Amount	Rs Lakh	620.20
			Total Equity Amount	Rs Lakh	265.80
		Debt Component	Loan Amount	Rs Lakh	620.20
			Moratorium Period	years	0
			Repayment Period(incld Moratorium)	years	15.00
			Interest Rate	%	9.00%
		Equity Component	Equity amount	Rs Lacs	265.80
			Return on Equity (upto 20 years)	% p.a	16.96%
			Return on Equity (after 20 years)	% p.a	21.52%
			Discount Rate (Equiv. to WACC)		8.30%
4	Financial Assumptions	Fiscal Assumptions	Income Tax	%	34.94%
			MAT Rate	%	17.47%
		Depreciation	Depreciation Rate(Power Plant)	%	4.67%
			Depreciation Rate 16th year onwards	%	2.00%
5	Working Capital	For Fixed Charges	O&M Charges	Months	1
			Maintenance Spare	(% of O&M exepenses)	15.00%
			Receivables for Debtors	Months	1.5
		For Variable Charges	Biomass Stock	Months	4
			Interest On Working Capital	%	10.50%
6	Fuel Related Assumptions	Biogas	Specific Fuel Consumption	kg/kWh	3
			Biogas Price	Rs/T	1493.10
			Substrate Price Escalation Factor	%	5.00%
7	Operation & Maintenance		O&M Cost of power plant	Rs Lakh	63.66
			Total O & M Expenses Escalation	%	3.84%
8	Generation & Sale of Energy		Total No .Of Hours		8766.00

CERC RE Tariff Order FY 2021-22

Biogas : Determination of Tariff Component

Units Generation	Unit	Year-->	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Installed Capacity	MW		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Net Generation	MU		6.94	6.94	6.94	6.94	6.94	6.94	6.94	6.94	6.94	6.94	6.94	6.94	6.94	6.94	6.94	6.94	6.94	6.94	6.94	6.94	6.94	6.94	6.94	6.94	6.94
Variable Cost	Unit	Year-->	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Biomass Cost	Rs. Lakh		353.39	371.06	389.61	409.09	429.55	451.03	473.58	497.26	522.12	548.22	575.63	604.42	634.64	666.37	699.69	734.67	771.41	809.98	850.47	893.00	937.65	984.53	1,033.76	1,085.45	1,139.72
Per unit Variable Cost	Rs/kWh		5.09	5.34	5.61	5.89	6.19	6.50	6.82	7.16	7.52	7.90	8.29	8.71	9.14	9.60	10.08	10.58	11.11	11.67	12.25	12.86	13.51	14.18	14.89	15.63	16.42
Fixed Cost	Unit	Year-->	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
O&M Expenses	Rs Lakh		63.66	66.11	68.65	71.28	74.02	76.86	79.81	82.88	86.06	89.37	92.80	96.36	100.06	103.91	107.90	112.04	116.34	120.81	125.45	130.26	135.27	140.46	145.85	151.46	157.27
Depreciation	Rs Lakh		41.35	41.35	41.35	41.35	41.35	41.35	41.35	41.35	41.35	41.35	41.35	41.35	41.35	41.35	41.35	41.35	41.35	41.35	41.35	41.35	41.35	41.35	41.35	41.35	41.35
Interest on term loan	Rs Lakh		53.96	50.24	46.52	42.79	39.07	35.35	31.63	27.91	24.19	20.47	16.75	13.02	9.30	5.58	1.86	-	-	-	-	-	-	-	-	-	-
Interest on working Capital	Rs Lakh		21.53	22.43	23.38	24.39	25.44	26.54	27.71	28.93	30.21	31.56	32.98	34.47	36.04	37.68	39.41	40.93	42.89	44.94	47.09	49.35	51.88	54.36	56.97	59.70	62.57
Return on Equity	Rs Lakh		45.09	45.09	45.09	45.09	45.09	45.09	45.09	45.09	45.09	45.09	45.09	45.09	45.09	45.09	45.09	45.09	45.09	45.09	45.09	45.09	45.09	45.09	45.09	45.09	45.09
Total Fixed Cost	Rs Lakh		225.59	225.21	224.98	224.90	224.97	225.20	225.59	226.15	226.90	227.83	228.96	230.29	231.84	233.60	235.60	237.78	239.99	242.34	244.83	247.46	250.23	253.14	256.19	259.38	262.71
Per unit Fixed Cost	Rs/kWh	3.33	3.25	3.24	3.24	3.24	3.24	3.24	3.25	3.26	3.27	3.28	3.30	3.32	3.34	3.36	3.39	3.41	3.42	3.43	3.44	3.45	3.46	3.47	3.48	3.49	3.50

Levelised tariff corresponding to Useful life

Per Unit Cost of Generation	Unit		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Per unit Variable Cost	Rs/kWh		5.09	5.34	5.61	5.89	6.19	6.50	6.82	7.16	7.52	7.90	8.29	8.71	9.14	9.60	10.08	10.58	11.11	11.67	12.25	12.86	13.51	14.18	14.89	15.63	16.42
O&M expn	Rs/kWh	1.29	0.92	0.95	0.99	1.03	1.07	1.11	1.15	1.19	1.24	1.29	1.34	1.39	1.44	1.50	1.55	1.61	1.68	1.74	1.81	1.88	1.95	2.02	2.10	2.18	2.27
Depreciation	Rs/kWh	0.53	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26
Int. on term loan	Rs/kWh	0.39	0.78	0.72	0.67	0.62	0.56	0.51	0.46	0.40	0.35	0.29	0.24	0.19	0.13	0.08	0.03	-	-	-	-	-	-	-	-	-	-
Int. on working capital	Rs/kWh	0.46	0.31	0.32	0.34	0.35	0.37	0.38	0.40	0.42	0.44	0.45	0.48	0.50	0.52	0.54	0.57	0.59	0.62	0.65	0.68	0.71	0.75	0.78	0.82	0.86	0.90
RoE	Rs/kWh	0.66	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.82	0.82	0.82	0.82
Total COG	Rs/kWh	3.33	8.34	8.59	8.85	9.13	9.43	9.74	10.07	10.42	10.79	11.18	11.59	12.02	12.48	12.96	13.47	13.99	14.51	14.96	15.64	16.35	17.28	18.07	18.89	19.75	20.66
Discount Factor			1	0.92	0.85	0.79	0.73	0.67	0.62	0.57	0.53	0.49	0.45	0.42	0.38	0.35	0.33	0.30	0.28	0.26	0.24	0.22	0.20	0.19	0.17	0.16	0.15
Variable Cost	5.09																										
Levilled Tariff (Fixed)	3.33																										
Levilled Tariff	8.42	Rs/Unit																									

Determination of Additional Depreciation

Depreciation amount	90%																										
Book Depreciation rate	5.28%																										
Tax Depreciation rate	40%																										
Additional Depreciation	20%																										
Income Tax (MAT)	17.472%																										
Income Tax (Normal Rates)	34.944%																										
Capital Cost	886.00																										
Years ----->	Unit	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
Book Depreciation	%	2.64%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	5.28%	2.88%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Book Depreciation	Rs Lakh	23.39	46.78	46.78	46.78	46.78	46.78	46.78	46.78	46.78	46.78	46.78	46.78	46.78	46.78	46.78	46.78	46.78	25.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Accelerated Depreciation																											
Opening	%	100%	70%	35%	21%	13%	8%	5%	3%	2%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Allowed during the year	%	30.00%	35.00%	14.00%	8.40%	5.04%	3.02%	1.81%	1.09%	0.65%	0.39%	0.24%	0.14%	0.08%	0.05%	0.03%	0.02%	0.01%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Closing	%	70.0%	35.0%	21.0%	12.6%	7.6%	4.5%	2.7%	1.6%	1.0%	0.6%	0.4%	0.2%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Accelerated Depm.	Rs Lakh	265.80	310.10	124.04	74.42	44.65	26.79	16.08	9.65	5.79	3.47	2.08	1.25	0.75	0.45	0.27	0.16	0.10	0.06	0.03	0.02	0.01	0.01	0.00	0.00	0.00	0.00
Net Depreciation Benefit	Rs Lakh	242.41	263.32	77.26	27.64	-2.13	-19.99	-30.71	-37.14	-40.99	-43.31	-44.70	-45.53	-46.03	-46.33	-46.51	-46.62	-46.68	-25.46	0.03	0.02	0.01	0.01	0.00	0.00	0.00	0.00
Tax Benefit	Rs Lakh	84.71	92.01	27.00	9.66	-0.74	-6.98	-10.73	-12.98	-14.32	-15.13	-15.62	-15.91	-16.08	-16.19	-16.25	-16.29	-16.31	-8.90	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Energy generation	MU	3.47	6.94	6.94	6.94	6.94	6.94	6.94	6.94	6.94	6.94	6.94	6.94	6.94	6.94	6.94	6.94	6.94	6.94	6.94	6.94	6.94	6.94	6.94	6.94	6.94	6.94
Per unit benefit	Rs/Unit	2.44	1.33	0.39	0.14	-0.01	-0.10	-0.15	-0.19	-0.21	-0.22	-0.22	-0.23	-0.23	-0.23	-0.23	-0.23	-0.23	-0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Discounting Factor		1.00	0.92	0.85	0.79	0.73	0.67	0.62	0.57	0.53	0.49	0.45	0.42	0.38	0.35	0.33	0.30	0.28	0.26	0.24	0.22	0.20	0.19	0.17	0.16	0.15	
Applicable Discounting Factor		1.00	0.96	0.89	0.82	0.76	0.70	0.65	0.60	0.55	0.51	0.47	0.43	0.40	0.37	0.34	0.31	0.29	0.27	0.25	0.23	0.21	0.20	0.18	0.17	0.15	
Tax Benefit Levellised	10.69	Rs/Unit																									
Electricity Generation (Levellised)	6.65	Rs/Unit																									
Levellised benefit	0.16	Rs/Unit																									